

REMARKS

Upon entry of the amendments in this paper, claims 2 and 6-11 will be pending in the above identified application. Claim 6 is herein amended. Claim 11 is herein added. It is respectfully submitted that this paper is fully responsive to the Office action mailed on May 11, 2011.

On the Merits

Claim Rejections - 35 U.S.C. §103(a)

Claims 2 and 6-10 stand rejected under 35 U.S.C. §103(a) as being unpatentable over JP 09-229064 to *Honma*. Claims 2 and 6-10 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Honma* in view of JP 06-241228 to *Komata*.

Independent Claim 6:

Independent claim 6 recites:

A ball spline comprising:

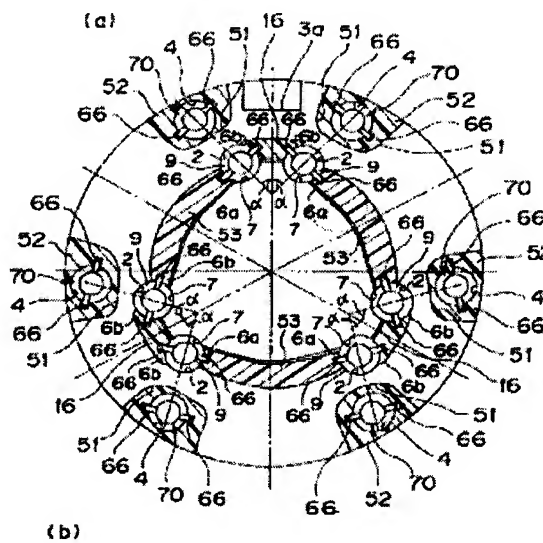
...

the spline nut has the ball return passages which are formed parallel to the load regions, and are situated in the contact normals n of the balls and the ball rolling faces....

In the new claim 6, the spline nut has the ball return passages which are formed parallel to the load regions, and are situated in the contact normals n of the balls and the ball rolling faces.

On the other hand, in the disclosure of *Honma* (JP09-229064), the ball return passages are not situated in the contact normals n of the balls and the ball rolling faces, as shown below in FIG. 8 for example.

【図8】



Claims 2 and 6-8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,127,309 to *Teramachi* in view of *Komata*

The examiner considers that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the number of grooves formed in the spline shaft of *Teramachi* (USP4,127,309) with only three rolling bearing grooves spaced about the outer surface of the spline shaft, as taught by *Komata* (JP06-241228).

However, the spline shaft of *Komata* provides the groove in the outer peripheral surface. The ball rolling faces 11 are formed on both sides in the width direction of each the said grooves. Further, the pair of rows of rollers rolling on the ball rolling faces 11 is incorporated into a single material 3.

In the above invention of *Komata*, when a person skilled in the art decreases a row of rollers as from FIG. 1 to FIG. 2, he/she will decrease material 3.

That is, in the above invention of *Komata*, it is necessary for the person skilled in the art to increase and decrease said grooves, when the person skilled in the art increases and decreases the rows of rollers.

On the other hand, in the invention of *Teramachi*, the grooves 9 are formed in the outer peripheral surface of the spline shaft 8. And, a pair of the ball rolling faces are formed on both sides in the width direction of each the groove 9, a pair of rows of balls rolling on the ball rolling faces are not incorporated in a single material such as material 3 of *Komata* and therefore becomes independent each other.

According to such constitution of *Teramachi*, it is not necessary for the person skilled in the art to increase and decrease the grooves 9, when the person skilled in the art increases and decreases the rows of balls.

That is, when the person skilled in the art decreases the number of rows of balls, the person skilled in the art does not have to decrease a pair of rows of balls rolling on the ball rolling faces situated on both sides of the groove 9 and can decrease a pair of rows of balls which is located to catch the land part.

That is, when the person skilled in the art decreases the number of rows of balls in the spline shaft of *Teramachi*, the the distance between a pair of rows of balls rolling on the ball rolling faces on both sides of each of the torque transmission grooves may be set larger than the distance between a pair of rows of balls rolling on the ball rolling faces situated on both sides of each of the land parts.

Therefore, even if the person skilled in the art makes allowance for the features disclosed in *Komata*, when the person skilled in the art forms three lines of grooves in the spline shaft of *Teramachi*, it's not always true that the distance between a pair of rows of balls rolling on the ball rolling faces situated on both sides of each of the land parts is set larger than the distance between a pair of rows of balls rolling on the ball rolling faces on both sides of each of the torque transmission grooves.

Consequently, a person skilled in the art cannot arrive at the present claim features of the new claim 6 based on *Teramachi* and *Komata*.

Regarding to the new claim 11

New claim 11 discloses that a pair of endless circulation paths situated on both sides of each torque transmission groove of the spline shaft cross each other.

According to the features of new claim 11, it is possible to set the distance between a pair of the ball rolling faces situated on both sides of the torque transmission groove, such that the width of the torque transmission groove is much smaller.

Therefore in the spline shaft, the sectional area reduction ratio of the shaft as a result of the machining is reduced, making it possible to enhance the machining efficiency.

Further, according to the features of new claim 11, it is possible to set the width of the torque transmission groove much smaller. Therefore, it is possible to form the section of the spline shaft in a substantially circular configuration, so that it is possible to make the geometrical moment of inertia of the spline shaft much larger, thereby making it possible to enhance the flexural rigidity of the spline shaft.

In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

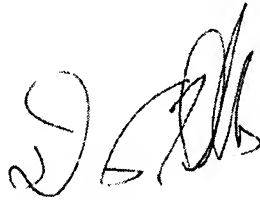
If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

Application No. 10/583,411
Art Unit: 3656

Amendment under 37 C.F.R. §1.111
Attorney Docket No. 062654

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,
WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP

A handwritten signature in black ink, appearing to read 'D. Hubbs', is positioned above the printed name of the attorney.

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